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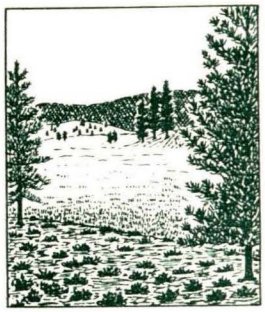

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ETHYLENE DIBROMIDE SPRAYS FOR CONTROLLING BARK BEETLES IN CALIFORNIA

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Ethylene dibromide sprays are now widely used in California for bark-beetle control. Two different formulations are recommended, an oil spray and a water emulsion spray. The oil spray can be used to control any of California's important bark beetles in any of the tree species they infest. The water emulsion can be used in lodgepole pine. Both cost about the same amount per gallon of spray, but the emulsion is cheaper when chemicals must be transported into roadless areas and water can be obtained close to the treating site.

Instructions for using both these sprays have been published previously, 1/ 2/ but new information gained through several years' use of each method is presented in this note. These penetrating sprays may eventually be replaced by residual sprays currently being developed. Until the new formulations are perfected, though, the penetrating sprays will be used.

1/ Downing, G. L. 1954. Ethylene dibromide sprays for controlling bark beetles in California. Misc. Paper No. 17, Calif. Forest and Range Expt. Sta. 2 pp.

2/ Stevens, Robert E. 1957. Ethylene dibromide emulsion spray for control of the mountain pine beetle in lodgepole pine. U. S. Forest Serv. Calif. Forest and Range Expt. Sta. Res. Note No. 122, 4 pp., 1957.

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ETHYLENE DIBROMIDE PENETRATING OIL SPRAY

Ethylene dibromide in a penetrating oil spray can be used for control of the western pine beetle, mountain pine beetle, Jeffrey pine beetle, California flatheaded borer, and occasionally pine engravers, on any of the various host trees in which these beetles occur

Spray Equipment

The type of equipment needed to apply the spray depends upon the nature of the control job. When only a few trees are to be treated, ordinary garden sprinkling cans are satisfactory (fig. 1). When accessible concentrations of trees are to be treated, it is sometimes advantageous to use a power sprayer, such as a Bean slip-on unit or a Pacific Marine slip-on unit. Best results with power equipment are obtained by maintaining pressure at the nozzle of 10 to 15 pounds per square inch. This low pressure avoids bouncing spray off the log or creating a mist which will usually drift away. Spray nozzles on power units should be of a type that allow for a large volume at low pressure. A showerhead can be adapted for this purpose.

Figure 1. --Using a garden-type sprinkling can to apply ethylene dibromide spray.

Treating Procedure

1. Prepare the spray. --Mix ethylene dibromide (EDB) and diesel oil in a suitable container at the rate of one pint of 85 percent EDB to 5 gallons of diesel. Always pour the oil into the container first, then add the EDB. Fifty-five gallon drums equipped with spigots are handy mixing tanks and are easy to fill spray cans from.

Mix the solution thoroughly; the EDB is much heavier than the oil and without vigorous mixing tends to settle to the bottom. Once mixed, it has little tendency to settle out if kept at temperatures above freezing.

Paddle-type mixing in open containers is not generally satisfactory. Upending the container 5 times, or rolling it 30 times, will provide adequate mixing, as will a plunger-type agitator, something that will lift the heavier EDB from the bottom of the tank and allow it to fall back through the oil.

2. Prepare the tree. --Fall and limb the tree, and buck the infested section of the trunk into lengths that can be rolled.

3. Apply the spray. --Thoroughly drench the uppermost face of each log until the insecticide puddles in the bark crevices. Allow the spray to soak into the bark, then roll the log so that an untreated area is on top and repeat the process. Continue treating and rolling until all of the outer surface has been covered. This usually requires three to four turns of the log. Special care should be exercised to avoid missing any areas, as beetles under unsprayed bark will not be killed. Treating should not be attempted when the bark is wet. Wait for it to dry to the point at which the oil will stay put when applied.

Rate of Application

The amount of spray required to treat an infested tree varies with the size of the tree. As a rule of thumb, the following may be used as a guide in determining quantities of oil spray needed for ponderosa, sugar, and Jeffrey pines.

Diameter breast high, inches:	Gallons of spray
12	6 - 8
18	8 - 10
24	15
30	25

ETHYLENE DIBROMIDE WATER EMULSION SPRAY

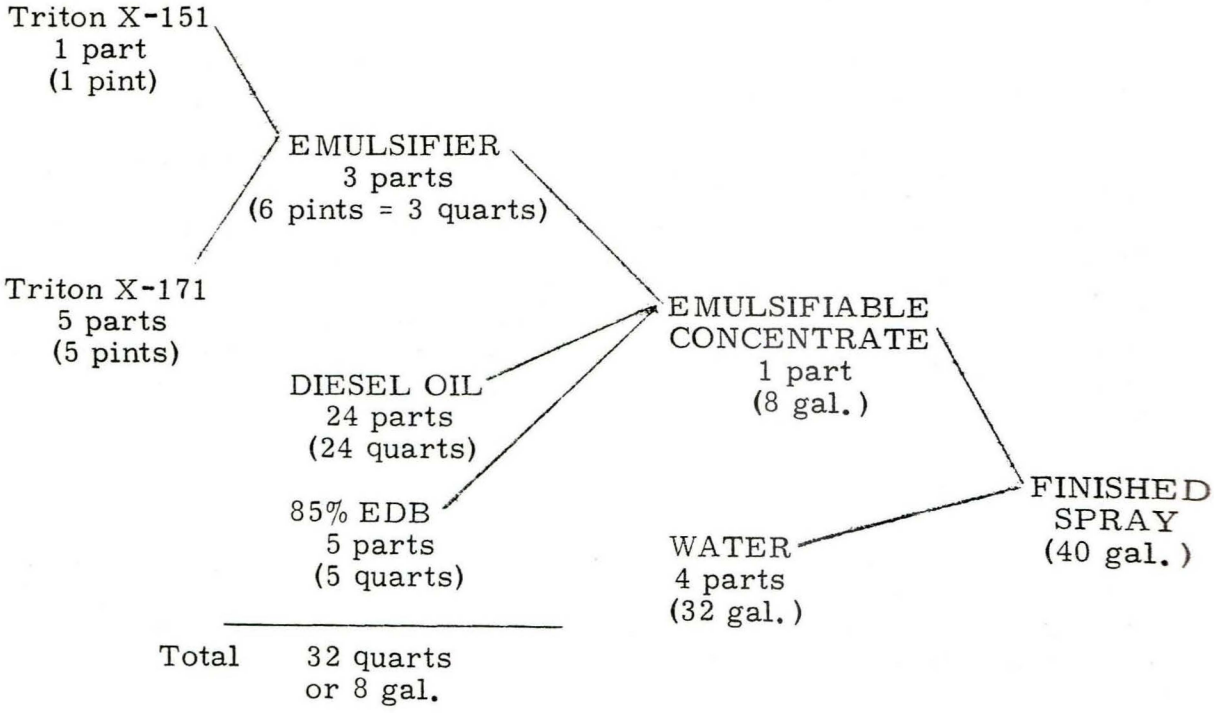
A water emulsion spray of EDB is generally preferred for controlling the mountain pine beetle in lodgepole pine. This spray consists of diesel oil, EDB, emulsifier, and water.

Spray Equipment

A garden-type sprinkling can is generally used to apply this spray. Power equipment may sometimes be advantageous.

Treating Procedure

1. Prepare the spray. --Mix the following materials together in the order and proportions shown below. The sample volumes in parentheses illustrate the proportions for 40 gallons of finished spray.



The emulsifiable concentrate must be well mixed. If it is not, separation of the component materials may occur at low temperatures. If possible, upend the container 5 or 6 times to let the heavier EDB fall through the oil.

If water is available in the woods, the final step of combining the emulsifiable concentrate and water can be done close to the treating site.

2. Prepare the tree. --Fall and limb the tree and buck it into sections that can be rolled.

3. Apply the spray. --Apply the spray to the upper surface of each log until the insecticide puddles in the bark crevices. Let it soak into the bark, then roll the log until an untreated area is up and repeat the process. Continue until all infested bark is treated. Beetles usually are not found in the upper part of the crown, and it is not necessary to spray this uninfested region.

An average of about 8 gallons of spray is needed to treat a lodgepole pine 36 inches in diameter at breast height.

Alternate Treating Procedure

A different method of spray application used in the Rocky Mountains might prove worthwhile in California. It requires a stirrup pump with an extension tube and adjustable spray nozzle (figs. 2 and 3). In this technique, as much of the trunk as possible is sprayed with a solid stream to the point of runoff while the tree is still standing. If there are insects farther up the trunk than the spray will reach, the tree is then felled, and the remainder of its infested length is sprayed with a flat spray on the ground. The limbs tend to hold the trunk off the ground, making it easier to spray the undersurface. If limbing is desirable it can be done after the spray is applied.

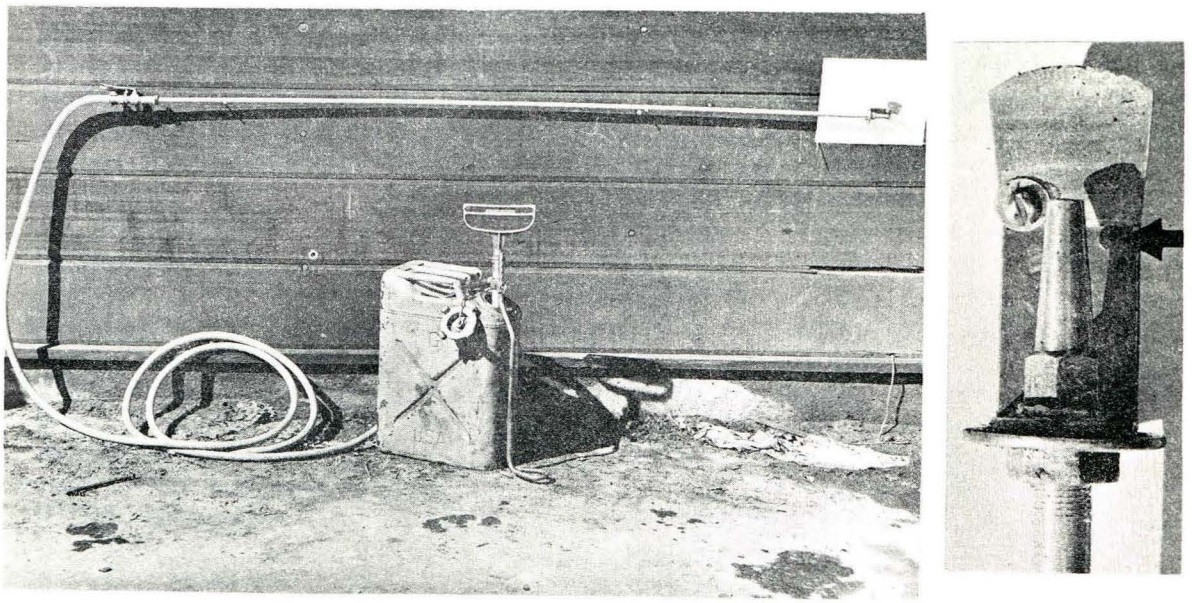


Figure 2. --Stirrup pump spray rig (left) and detail of spray nozzle. Plate beneath orifice swings aside for solid stream, and pin (arrow) prevents it from swinging back too far.

Figure 3. --Stirrup pump spray rig in use.

This technique, though not tested in California, should be effective and might result in a substantial reduction in treating time. Most of the parts of the spray rig can be made and assembled in any shop. The only critical component is the spray nozzle, which must conform to specifications to provide a solid stream. Instructions for machining the nozzle can be obtained from the California Forest and Range Experiment Station.

Supply

Ethylene dibromide can be obtained from most agricultural chemical suppliers. Dow Chemical Company markets the 85 percent material as "Dowfume W-85." The emulsifying agents, Triton X-151 and Triton X-171, are available from the Rohm and Haas Company, 600 California Street, San Francisco. Costs of the materials vary, depending on quantities bought, bid advantages, etc. An approximate figure that may be useful in preliminary calculations is 25 to 30 cents per gallon, for either of the sprays.

CAUTION

EDB and diesel oil are both skin irritants. Any materials spilled on the skin should be washed off immediately with soap and water. Do not wear clothing that is saturated with EDB, and avoid breathing its fumes. Read the precautions on the label. If it is necessary to store 85 percent EDB outside, store the drums on their sides. Avoid storing emulsion concentrate for long periods of time (over winter) in metal containers. If EDB is subjected to temperatures below 23° F., warm to 50° F. and mix thoroughly before using.

Note: Use of trade names of products or equipment does not connote endorsement of their use nor criticism of similar items which are not mentioned.